

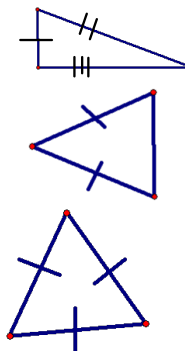
4.1 Apply Triangle Sum Properties

Classify Triangles

- By Sides
- By Angles

By Sides

- Scalene
 - No congruent sides
- Isosceles
 - 2 congruent sides
- Equilateral
 - 3 congruent sides

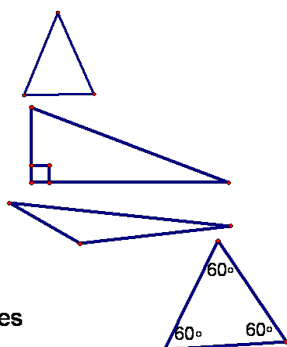


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By Angles

- Acute
 - 3 acute angles
- Right
 - 1 right angle
- Obtuse
 - 1 obtuse angle
- Equiangular
 - 3 congruent angles



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Example

Classify the triangle by sides. *Isosceles* $\triangle ABC$ A(-5, -2) B(1, 4) C(1, -2)

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$AB = \sqrt{72} = 6\sqrt{2}$$

$$BC = 6$$

$$AC = \sqrt{(-5-1)^2 + (-2-2)^2} = 6$$

Is it a right triangle?

$$\overline{AC} \perp \overline{BC}?$$

$$\overline{BC} \quad m = \frac{6}{0} \text{ undefined}$$

$$\overline{AC} \quad m = \frac{0}{6} = 0$$

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Example

Classify the triangle by sides.

$\triangle AMY$ A(-3, 4) M(3, 1) Y(0, -2)

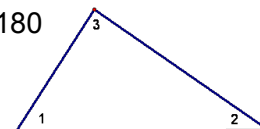
Is it a right triangle?

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Theorem 4.1—Triangle Sum

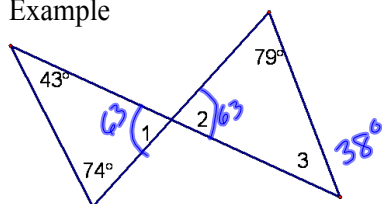
Theorem—the sum of the measures of the angles of a triangle is 180 degrees

$$m\angle 1 + m\angle 2 + m\angle 3 = 180$$



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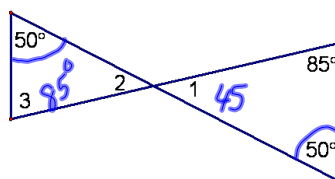
Example



$$\begin{array}{r} 74 \\ + 43 \\ \hline 117 \end{array} \quad \begin{array}{r} 180 \\ - 117 \\ \hline 63 \end{array}$$

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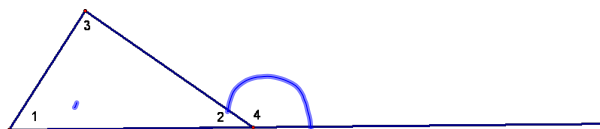
Example



$$\begin{array}{r} 85 \\ + 50 \\ \hline 135 \end{array}$$

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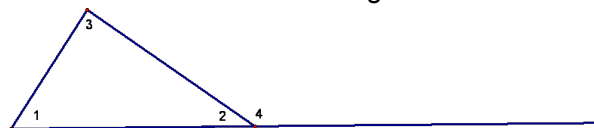
What is $\angle 2$ to 180?



$$\begin{aligned} m\angle 1 + m\angle 2 + m\angle 3 &= 180 \\ 180 &= m\angle 2 + m\angle 4 \\ m\angle 1 + \cancel{m\angle 2} + m\angle 3 &= \cancel{m\angle 2} + m\angle 4 \\ m\angle 1 + m\angle 3 &= m\angle 4 \end{aligned}$$

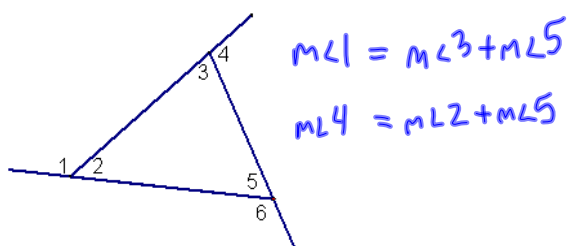
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Theorem 4.2—Exterior Angle Theorem—The measure of an exterior angle of a triangle = the sum of the 2 remote interior angles.



$$m\angle 1 + m\angle 3 = m\angle 4$$

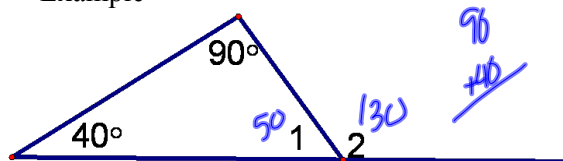
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$$\begin{aligned} m\angle 1 &= m\angle 3 + m\angle 5 \\ m\angle 4 &= m\angle 2 + m\angle 5 \end{aligned}$$

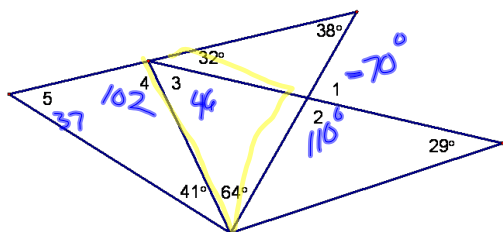
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Example



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Find the measures of the numbered angles.



Corollary- Statement that can be easily proven

Corollary —The acute angles of a right triangle are complementary

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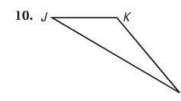
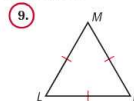
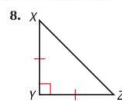
Homework

- p. 221-222 #s 1-11, 17-19, 21-26, 32-34

VOCABULARY Match the triangle description with the most specific name.

- | | |
|--|----------------|
| 1. Angle measures: $30^\circ, 60^\circ, 90^\circ$ | A. Isosceles |
| 2. Side lengths: 2 cm, 2 cm, 2 cm | B. Scalene |
| 3. Angle measures: $60^\circ, 60^\circ, 60^\circ$ | C. Right |
| 4. Side lengths: 6 m, 3 m, 6 m | D. Obtuse |
| 5. Side lengths: 5 ft, 7 ft, 9 ft | E. Equilateral |
| 6. Angle measures: $20^\circ, 125^\circ, 35^\circ$ | F. Equiangular |
7. ★ **WRITING** Can a right triangle also be obtuse? *Explain* why or why not.

CLASSIFYING TRIANGLES Copy the triangle and measure its angles. Classify the triangle by its sides and by its angles.



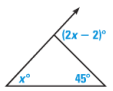
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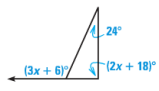
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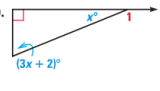
COORDINATE PLANE A triangle has the given vertices. Graph the triangle and classify it by its sides. Then determine if it is a right triangle.

11. $A(2, 3), B(6, 3), C(2, 7)$

ALGEBRA Find the measure of the exterior angle shown.

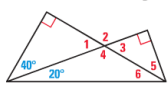
17. 

18. 

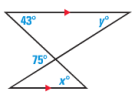
19. 

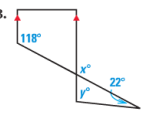
ANGLE RELATIONSHIPS Find the measure of the numbered angle.

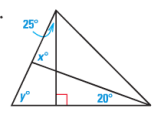
21. $\angle 1$ 22. $\angle 2$
23. $\angle 3$ 24. $\angle 4$
25. $\angle 5$ 26. $\angle 6$



ALGEBRA In Exercises 32–37, find the values of x and y .

32. 

33. 

34. 

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